What is claimed is:

1. A substrate processing apparatus comprising:

(a) a chamber comprising a radiation source;

(b) one or more detectors to detect a first radiation from the chamber, and a second radiation from the radiation source; and

(c) a signal analyzer to normalize a property of the first radiation relative to a property of the second radiation.

2. An apparatus according to claim 1 wherein the detectors are adapted to detect the same property of the first and second radiation, the property comprising one or more of an intensity, phase or wavelength.

3. An apparatus according to claim 1 wherein the detectors are adapted to detect the first and second radiation to determine an endpoint of the process.

4. An apparatus according to claim 1 comprising a first detector to detect a first radiation that is reflected in the chamber and generate a sample signal; and a second detector to detect a second radiation from the radiation source and generate a reference signal.

5. An apparatus according to claim 4 wherein the signal analyzer normalizes the reference and sample signals relative to one another to determine a normalized signal.

6. An apparatus according to claim 5 wherein the signal analyzer normalizes the reference and sample signals by determining a ratio of the signals.

7. An apparatus according to claim 6 wherein the signal analyzer is adapted to determine a corrected sample signal by applying a correction factor to the normalized signal.

8. An apparatus according to claim 7 wherein the signal analyzer determines a corrected sample signal, X_{mt}, using the expression $X_{mt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is the correction factor, Y_0 is the reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

9. An apparatus according to claim 8 wherein the signal analyzer determines the correction factor using the equation $C = \{Y_0(X_t - X_1)\}/\{X_1(Y_t - Y_0)\}$, where X_1 is the sample signal at time 1.

10. An apparatus according to claim 8 wherein the signal analyzer determines the correction factor by the equation $C = X_0 / X_1$; where X_0 is the sample signal at time 0; and X_1 is the sample signal at time 1.

11. An apparatus according to claim 4 further comprising a radiation pathway capable of transmitting the second radiation from the radiation source to the second detector.

12. An apparatus according to claim 11 wherein the radiation pathway is in a radiation transmitting fiber.

13. An apparatus according to claim 12 wherein the radiation transmitting fiber comprises an optical fiber.

14. An apparatus according to claim 1 wherein the radiation source comprises a lamp, light emitting diode, laser, or a radiation emission from a plasma in the chamber.

15. A method for monitoring processing of a substrate in a chamber, the method comprising the steps of:

(a) providing radiation in the chamber, detecting the radiation after it interacts with the substrate being processed, and generating a sample signal;

(b) detecting a reference radiation that does not interact with the substrate and generating an reference signal; and

(c) normalizing the sample signal relative to the reference signal.

16. A method according to claim 15 wherein step (c) comprises the step of determining a ratio of the reference signal and the sample signal, or subtracting the reference signal from the sample signal.

17. A method according to claim 16 further comprising the step of correcting for a background radiation by applying a correction factor to the sample signal to determine a corrected sample signal.

18. A method according to claim 17 comprising the step of determining the corrected sample signal, X_{nt}, using the expression $X_{nt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$;

wherein C is the correction factor, Y_0 is the reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

19. A method according to claim 18 comprising the step of calculating the correction factor using the equation $C = \{Y_0(X_t - X_1)\}/\{X_1(Y_t - Y_0)\}$;

wherein X_1 is the sample signal at time 1.

20. A method according to claim 18 comprising the step of calculating the correction factor using the equation $C = X_0 / X_1$;

wherein X_0 is the sample signal at time 0, and X_1 is the sample signal at time 1.

21. A method according to claim 18 wherein step (b) comprises detecting radiation reflected from the substrate being processed in the chamber.

22. A method according to claim 18 further comprising the step of detecting the reference radiation by transmitting radiation from a radiation source directly to a detector.

23. A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the chamber comprising a radiation source;

(b) a detector to detect a reflected radiation from the chamber and generate a sample signal; and

(c) a signal analyzer adapted to receive the sample signal and determine a corrected sample signal, X_{nt}, using the expression $X_{nt} = X_t / \{Y_0 + C(Y_t - Y_0)\}$,

where C is the correction factor, Y_0 is the reference signal at time 0, X_t is the sample signal at time t, and Y_t is the reference signal at time t.

24. An apparatus according to claim 23 wherein the signal analyzer determines the correction factor using the equation $C = \{Y_0(X_t - X_1)\}/\{X_1(Y_t - Y_0)\}$; where X_1 is the sample signal at time 1.

25. An apparatus according to claim 23 wherein the signal analyzer determines the correction factor using the equation $C = X_0 / X_1$; where X_0 is the sample signal at time 0; and X_1 is the sample signal at time 1.

26. An apparatus according to claim 23 wherein the detector is adapted to detect a radiation originating from the radiation source and generate a reference signal, and wherein the signal analyzer is adapted to receive the reference signal and determine a normalized signal from the sample and reference signals.

27. An apparatus according to claim 26 wherein the signal analyzer determines the normalized signal by calculating a ratio of the sample and reference signals.

28. An apparatus according to claim 23 further comprising a radiation pathway capable of transmitting radiation from the radiation source to the reference detector.

29. An apparatus according to claim 28 wherein the radiation pathway is in one or more fibers.

30. A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the chamber comprising a radiation source;

(b) a sample detector to detect a reflected radiation from the chamber and generate a sample signal;

(c) a reference detector to detect a reference radiation from the radiation source and generate a reference signal; and

(d) one or more first fibers to transmit the reference radiation to the reference detector.

31. An apparatus according to claim 30 further comprising second fibers to transmit radiation from the radiation source to the chamber.

32. An apparatus according to claim 31 wherein the first and second fibers are arranged to receive radiation from one or more areas of the radiation source that have about the same size.

33. An apparatus according to claim 32 wherein the areas are from the same region of the radiation source.

34. An apparatus according to claim 31 wherein the first and second fibers are arranged to have substantially overlapping field of views.

35. An apparatus according to claim 31 wherein the first fibers lead directly from the radiation source to the reference detector.

36. An apparatus according to claim 31 further comprising a lens to focus the reference radiation from the radiation source onto the first fibers.

37. An apparatus according to claim 31 further comprising a signal analyzer to receive the reference and sample signals and normalize one relative to the other, and optionally, to correct the sample signal for background radiation.

38. A substrate processing apparatus comprising:

(a) a chamber capable of processing a substrate, the chamber comprising a radiation source that includes a plasma;

(b) a sample detector to detect a reflected radiation from a substrate in the chamber and generate a sample signal;

(c) a reference detector to detect a reference radiation from the plasma and generate a reference signal; and

(d) one or more first fibers to transmit the reference radiation to the reference detector.

39. An apparatus according to claim 38 wherein the second fibers receive radiation from the side of the plasma, or from an angle of the plasma which is not above the substrate.

40. A substrate processing apparatus comprising:

(a) a chamber comprising a radiation source;

(b) a detector to detect a property of a radiation from a radiation source; and

(c) a feedback controller to regulate a power level of the radiation source in relation to the detected property of the radiation.

41. An apparatus according to claim 40 wherein the feedback controller is adapted to control a power supply that powers the radiation source.

42. An apparatus according to claim 40 wherein the feedback controller is adapted to maintain the property of the radiation at a constant level.

43. An apparatus according to claim 40 wherein the detector is adapted to detect a property of the radiation comprising one or more of an intensity, phase or wavelength.

44. A substrate processing apparatus comprising:

(a) a chamber;

(b) a radiation source;

(c) a detector to detect a property of a radiation from a radiation source and generate a reference signal; and

(d) a radiation modulator in a path of a radiation being transmitted from the radiation source to the chamber, whereby the radiation modulator may receive a signal from the radiation source and control a property of the radiation in relation to the reference signal.

45. An apparatus according to claim 44 wherein the detector is adapted to detect a property of the radiation comprising one or more of an intensity, phase or wavelength.

46. An apparatus according to claim 44 wherein the radiation modulator is adapted to regulate an intensity of the radiation.

47. An apparatus according to claim 44 wherein the radiation modulator is adapted to maintain the intensity of the radiation at a constant level.

48. An apparatus according to claim 44 wherein the radiation modulator comprises a shutter, mirror, or variable density screen.

49. An apparatus according to claim 48 wherein the radiation modulator comprises a means for partially attenuating the radiation.

50. An apparatus according to claim 44 wherein the radiation modulator comprises an electro-optical or acoustic-optical transducer.

51. An apparatus according to claim 44 wherein the radiation is transmitted to the detector by one or more radiation transmitting fibers.

52. A method for monitoring processing of a substrate in a chamber, the method comprising the steps of:

(a) providing radiation in the chamber;

(b) detecting a reference radiation that does not interact with the substrate and generating an reference signal; and

(c) controlling a property of the radiation in relation to the reference signal.

53. A method according to claim 50 wherein step (c) comprises controlling a power level applied to a power supply of a radiation source.

54. A method according to claim 50 further comprising the steps of detecting the radiation after it interacts with the substrate being processed, and generating a sample signal and determining a ratio of the reference signal and the sample signal, or subtracting the reference signal from the sample signal.

55. A method according to claim 51 further comprising the step of correcting for a background radiation by applying a correction factor to the sample signal to determine a corrected sample signal.

56. A method according to claim 54 comprising the step of transmitting the reference radiation through a fiber.